

VISIT...

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CLAMPS AND CLAMPING

Unfortunately, glass apparatus needs to be held in place with more than just spit and bailing wire. In fact, you would do well to use clamps. Life would be simple if there were just one type of fastener, but that's not the case.

1. **The simple buret clamp** (Fig. 87). Though popular in other chem labs, the simple buret clamp just doesn't cut it for organic lab. The clamp is too short, and adjusting angles with the "locknut" (by loosening the locknut, swiveling the clamp jaws to the correct angle, and tightening the locknut against the *back stop*, away from the jaws) is not a great deal of fun. If you're not careful, the jaws will slip right around and all the chemicals in your flask will fall out.
2. **The simple extension clamp and clamp fastener** (Fig. 88). This two-piece beast is the second best clamp going. It is much longer (approximately 12 inches), so you can easily get to complex setups. By loosening the **clamp holder thumbscrew**, the clamp can be pulled out, or pushed back, or rotated to any angle. By loosening the **ringstand thumbscrew**, the clamp, along with the clamp holder, can move up and down.
3. **The three-fingered extension clamp** (Fig. 89). This is truly the Cadillac of clamps with a price to match. They usually try to confuse

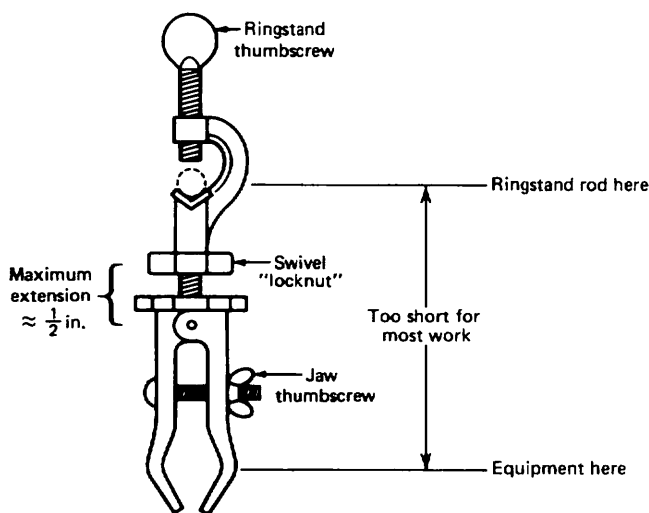


Fig. 87 The "barely adequate for organic lab" buret clamp.

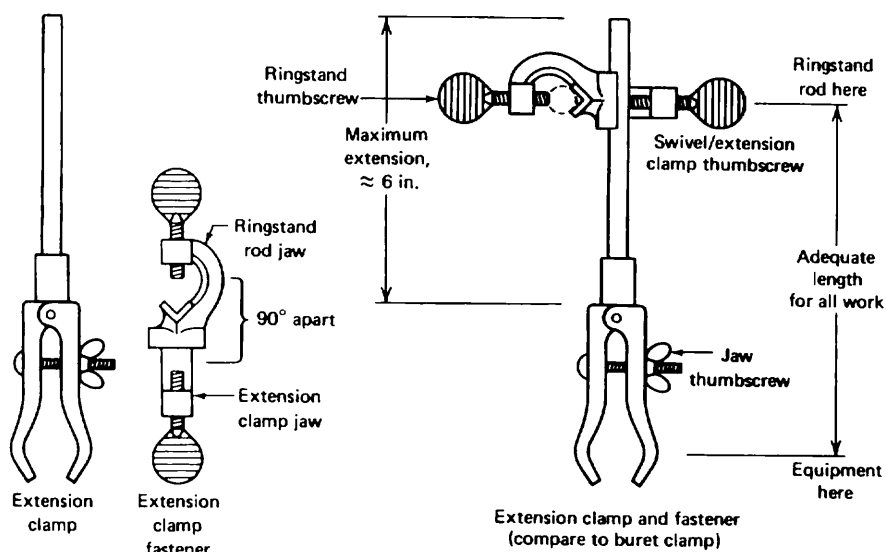


Fig. 88 The extension clamp and clamp fastener.

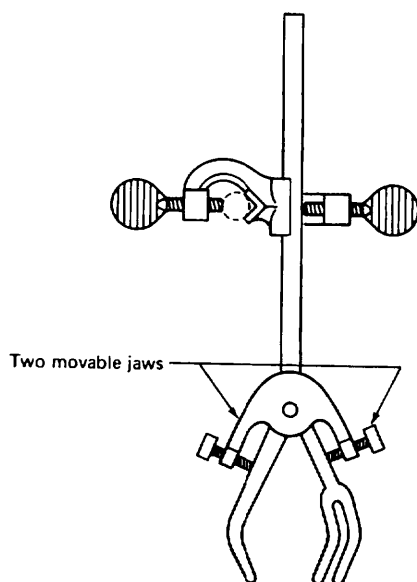


Fig. 89 The three-fingered clamp with clamp fastener.

you with *two thumbscrews* to tighten, unlike the regular extension clamp. This gives a bit more flexibility, at the cost of a slightly more complicated way of setting up. You can make life simple by opening the *two-prong bottom jaw* to a 10° to 20° angle from the horizontal and *treating that jaw as fixed*. This will save a lot of wear and tear when you set equipment up, but you can *always move the bottom jaw* if you have to.

CLAMPING A DISTILLATION SETUP

You'll have to clamp many things in your life as a chemist, and one of the more frustrating setups to clamp is the **simple distillation** (see Chapter 20, "Distillation"). If you can set this up, you probably will be able to clamp other common setups without much trouble. Here's one way to go about setting up the simple distillation.

1. OK, get a **ringstand** and an **extension clamp** and a **clamp fastener** and put them all together. What heat source? A Bunsen burner, and you'll need more room than you do with a heating mantle (see Chapter 18, "Sources of Heat"). In any case, you don't know where the receiving flask will show up, and then you might have to readjust the entire setup. Yes, you should have read the experiment before so you'd know about the heating mantles.
2. Clamp the flask (around the neck) a few inches up the ringstand (Fig. 90). We *are* using heating mantles, and you'll need the room underneath to drop the mantle in case it gets too hot. That's why the flask is *clamped at the neck*. Yes. *That's where the flask is ALWAYS clamped, no matter what heat source*, so it doesn't fall when the mantle comes down. What holds the mantle? Extension ring and clamp fastener.
3. Remember, whether you set these up from left to right, or right to left—*distilling flask first!*
4. Add the three-way adapter now (Fig. 91). Thermometer and thermometer adapter come later.
5. Put a second ringstand about one condenser length away from the first ringstand. Now add the condenser, just holding it onto the three-way adapter. Make a mental note of where the inner joint (end) of the condenser is—you'll want to put a clamp about there. Remove the condenser (Fig. 92).

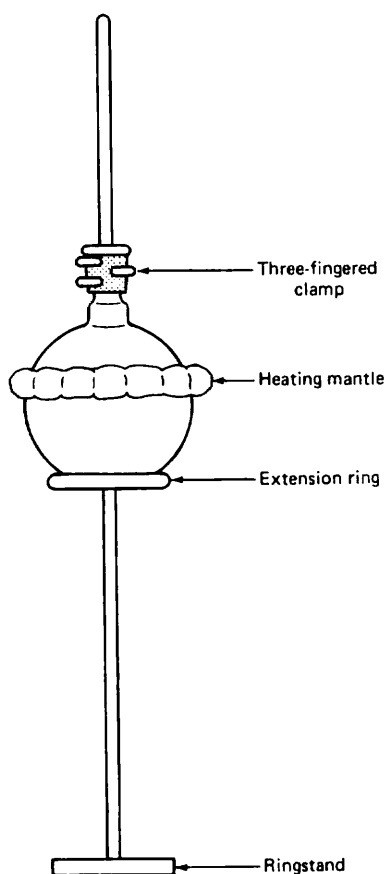


Fig. 90 Flask and heating mantle out on a ringstand.

6. Get an extension clamp and clamp fastener. Open the jaws of the clamp so they're *wider* than the outer joint on a vacuum adapter. Set this clamp so that it can accept the outer joint of a vacuum adapter at the angle and height you made a mental note of in step 5.
7. Put a vacuum adapter on the end of your condenser and hold it there. Put the top of the condenser (outer joint) onto the three-way adapter, and get the vacuum adapter joint cradled in the clamp you've set for it. Push the condenser/vacuum adapter toward the three-way adapter; lightly tighten the clamp on the vacuum adapter. The clamp **must** stop the vacuum adapter from slipping *off the condenser* (Fig. 93).

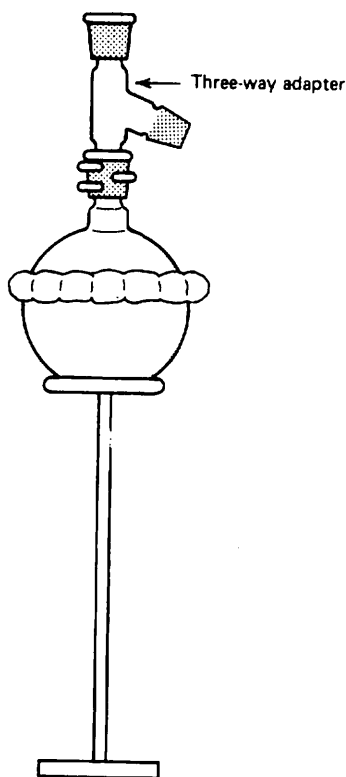


Fig. 91 Clamps and flask and three-way adapter.

8. At this point, you have two clamps, one holding the distilling flask and the other at the end of the condenser/vacuum adapter (Fig. 94).
9. There are two ways to go now:
 - a. The receiving flask will not fit vertically from the end of the vacuum adapter to the benchtop (Fig. 94). Easy. With the vacuum adapter clamp **relaxed** (not so loose that the adapter falls off!), rotate the adapter toward you. There's no reason it *has* to be at a right angle. Stick a receiving flask on the end, put a suitable cork ring under the flask, and that's it. Note that you can **easily** change receiving flasks. Just slide one off and slide another on.

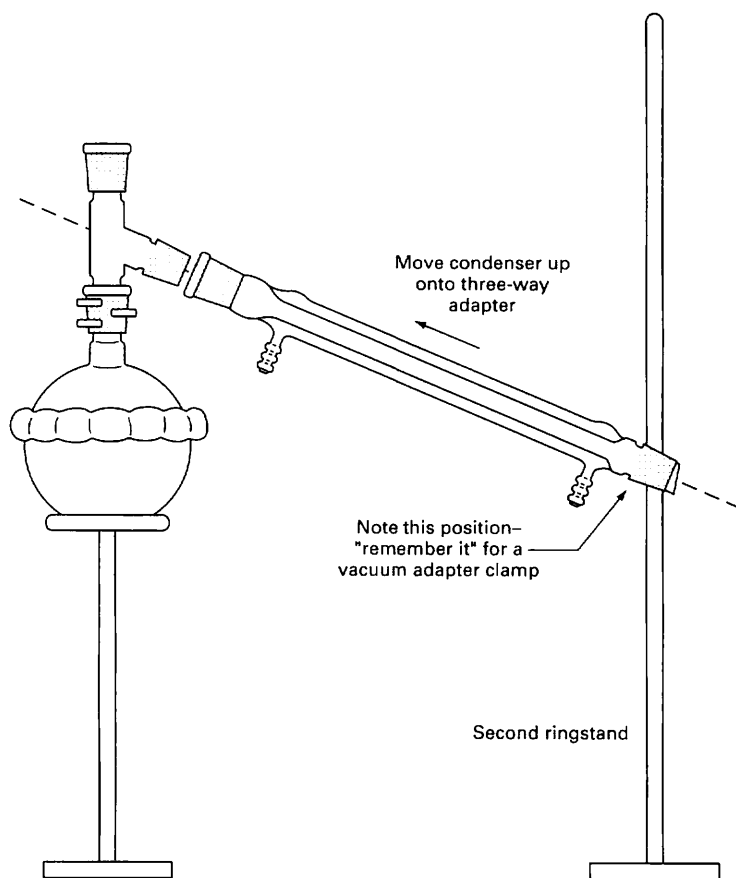


Fig. 92 Trial fit for vacuum adapter.

- b. There's a lot of room from the end of the vacuum adapter to the benchtop. In this case, you'll have to set up another clamp (possibly another ringstand) and clamp the flask at the neck (Fig. 95). This will make changing the receiving flask a bit more difficult; you'll have to unclamp one flask before slipping another in and re-clamping the new one.
10. All the clamps are set up, all the joints are tight—now where is that thermometer adapter?

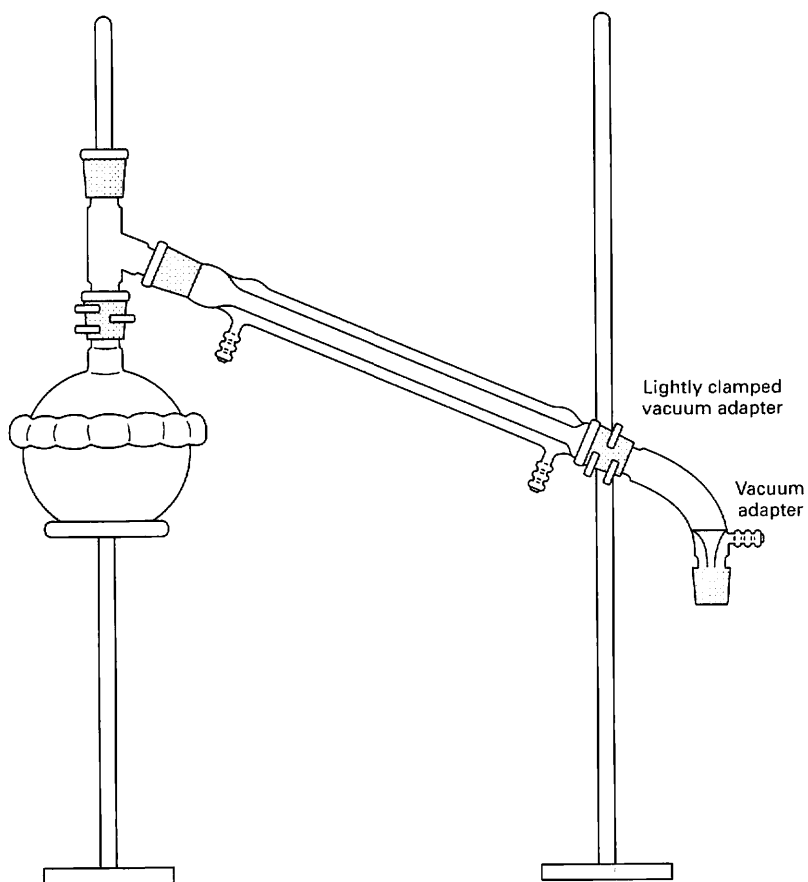


Fig. 93 Correctly clamping the vacuum adapter.

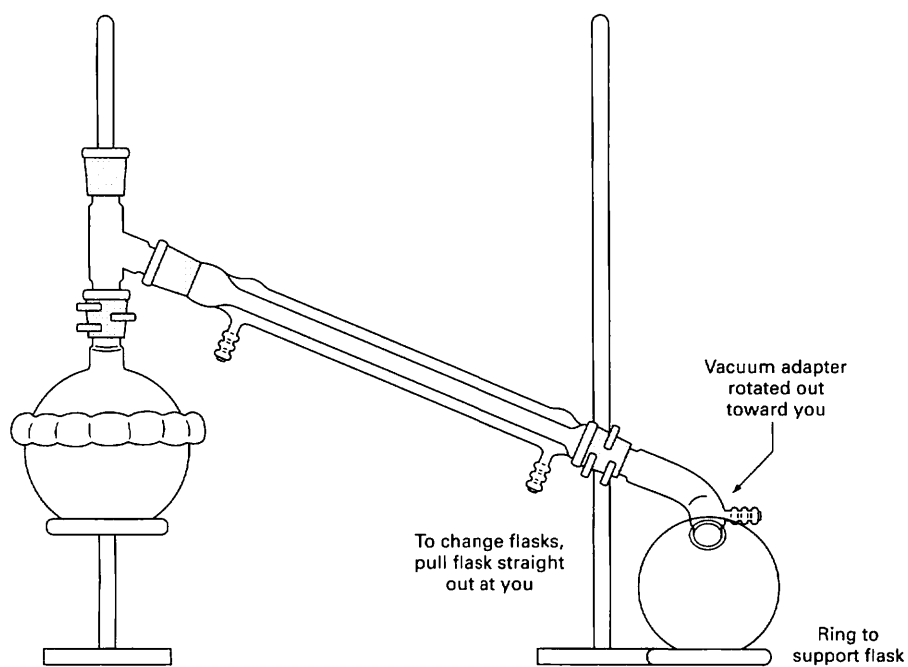


Fig. 94 Distillation setup with receiving flask rotated toward you.

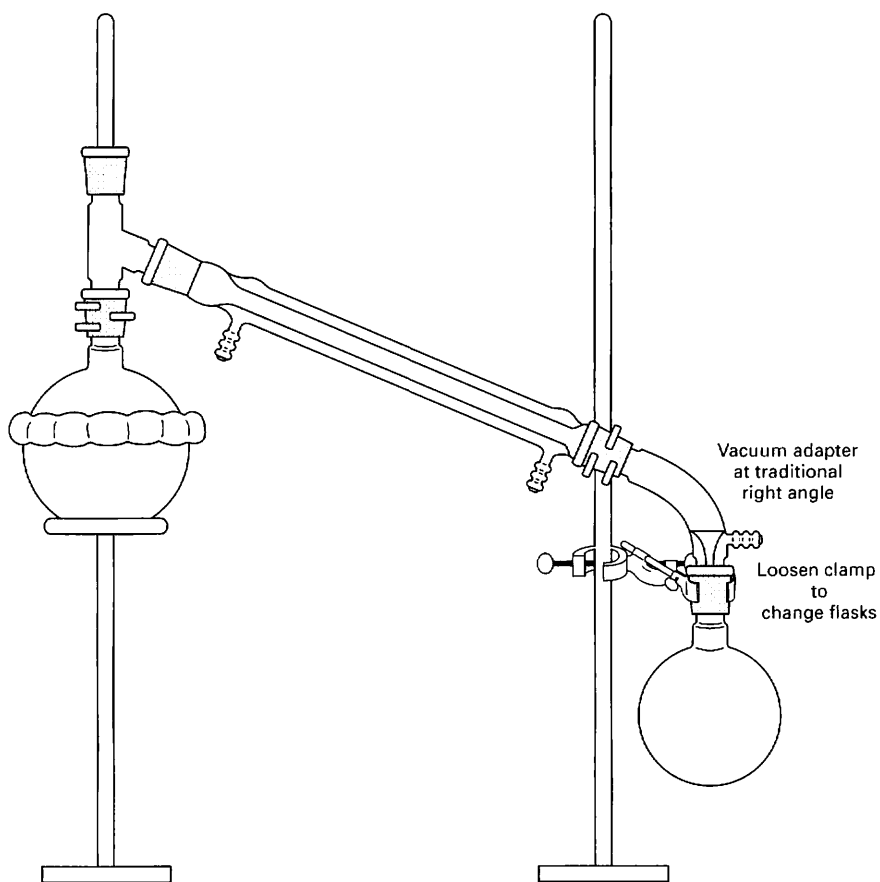


Fig. 95 Distillation setup with receiving flask at usual right-angle position.